

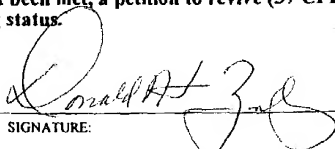
FORM PTO-1390 (REV 11-98)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTORNEY'S DOCKET NUMBER P03958US1	
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371				U.S. APPLICATION NO. (if known, see 37 CFR 1.5)	
				09/674399	
INTERNATIONAL APPLICATION NO. PCT/US00/02028		INTERNATIONAL FILING DATE 26 January 2000 (26.01.00)		PRIORITY DATE CLAIMED 5 April 1999 (5.04.99)	
TITLE OF INVENTION METHOD AND MEANS FOR FILLING NATURAL CASING SAUSAGES					
APPLICANT(S) FOR DO/EO/US CATE et al.					
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:					
<ol style="list-style-type: none"> <li>1. <input checked="" type="checkbox"/> This is a <b>FIRST</b> submission of items concerning a filing under 35 U.S.C. 371.</li> <li>2. <input type="checkbox"/> This is a <b>SECOND</b> or <b>SUBSEQUENT</b> submission of items concerning a filing under 35 U.S.C. 371.</li> <li>3. <input checked="" type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).</li> <li>4. <input type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.</li> <li>5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2)) <ol style="list-style-type: none"> <li>a. <input type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau).</li> <li>b. <input type="checkbox"/> has been transmitted by the International Bureau.</li> <li>c. <input checked="" type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US).</li> </ol> </li> <li>6. <input type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)).</li> <li>7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)) <ol style="list-style-type: none"> <li>a. <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau).</li> <li>b. <input checked="" type="checkbox"/> have been transmitted by the International Bureau.</li> <li>c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</li> <li>d. <input type="checkbox"/> have not been made and will not be made.</li> </ol> </li> <li>8. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).</li> <li>9. <input type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).</li> <li>10. <input type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</li> </ol>					
Items 11. to 16. below concern document(s) or information included:					
<ol style="list-style-type: none"> <li>11. <input type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.</li> <li>12. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.</li> <li>13. <input type="checkbox"/> A FIRST preliminary amendment. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment.</li> <li>14. <input type="checkbox"/> A substitute specification.</li> <li>15. <input type="checkbox"/> A change of power of attorney and/or address letter.</li> <li>16. <input checked="" type="checkbox"/> Other items or information: <ul style="list-style-type: none"> <li>-Certificate of Express Mailing (in duplicate) Label No. EL688892880US</li> <li>-Executed Small Entity Statement</li> <li>-Copy of Article 19 Amendment</li> </ul> </li> </ol>					

US

Annex US.II, page 2

PCT Applicant's Guide - Volume II - National Chapter - US

529 Rec'd PCT/PTC 31 OCT 2000

09/674399 U.S. APPLICATION NO. (if known, see 37 CFR 1.53)		INTERNATIONAL APPLICATION NO. PCT/US00/02028		ATTORNEY'S DOCKET NUMBER P03958US1		
17. <input checked="" type="checkbox"/> The following fees are submitted: <b>BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5)):</b> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO ..... \$970.00  International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO ..... \$840.00  International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... \$760.00  International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) ..... \$670.00  International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) ..... \$96.00  <b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b>				<b>CALCULATIONS PTO USE ONLY</b>          		
Surcharge of \$130.00 for furnishing the oath or declaration later than <input checked="" type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$ 840.00 \$ 130.00		
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE			
Total claims	24 - 20 =	4	X \$18.00	\$ 72.00		
Independent claims	7 - 3 =	4	X \$78.00	\$ 312.00		
MULTIPLE DEPENDENT CLAIM(S) (if applicable)				+ \$260.00	\$	
<b>TOTAL OF ABOVE CALCULATIONS =</b>				<b>\$ 1354.00</b>		
Reduction of 1/2 for filing by small entity, if applicable. A Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28).				\$ 677.00		
<b>SUBTOTAL =</b>				<b>\$ 677.00</b>		
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				\$ +		
<b>TOTAL NATIONAL FEE =</b>				<b>\$ 677.00</b>		
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property				\$ +		
<b>TOTAL FEES ENCLOSED =</b>				<b>\$ 677.00</b>		
				<b>Amount to be:</b>	<b>\$</b>	
				<b>refunded</b>		
				<b>charged</b>	<b>\$</b>	
a. <input checked="" type="checkbox"/> A check in the amount of \$ <u>677.00</u> to cover the above fees is enclosed.  b. <input type="checkbox"/> Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.  c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. <u>26-0084</u> . A duplicate copy of this sheet is enclosed.						
<b>NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.</b>						
SEND ALL CORRESPONDENCE TO: DONALD H. ZARLEY ZARLEY, McKEE, THOMTE, VOORHEES & SEASE, P.L.C. 801 Grand Avenue, Suite 3200 Des Moines, Iowa 50309-2721 US Phone: (515) 288-3667 Fax: (515) 288-1338						
				SIGNATURE:  Donald H. Zarley	NAME 18,543 REGISTRATION NUMBER	

# PATENT COOPERATION TREATY

## PCT

LIST OF DOCUMENTS FILED WITH THE  
INTERNATIONAL BUREAU  
AS RECEIVING OFFICE

To:

The International Bureau of WIPO  
PCT Receiving Office Section  
34, chemin des Colombettes  
1211 Geneva 20  
Switzerland

Facsimile No. (41-22) 910 06 10

Applicant's or agent's file reference  
P3958 127770

International application No.  
(if known)  
PCT/US 00/ 02028

International filing date (day/month/year)  
(if known)  
26/01/2000

(Earliest) Priority date  
(day/month/year)

Applicant

TOWNSEND ENGINEERING COMPANY et al.

Title of invention

METHOD AND MEANS FOR FILLING NATURAL CASING SAUSAGES

The applicant hereby requests the International Bureau to acknowledge to the following person (include full name, address, facsimile No. and telephone No.):

Kirk M. Hartung  
ZARLEY MCKEE THOMTE VOORHEES & SEASE  
801 Grand Ave., Suite 3200, Des Moines, Iowa 50309-2721  
Phone: (515) 288-3667  
Facsimile: (515) 288-1338

the receipt by the following means:

☒ mail (surface, air mail, registered) ☐ delivery service ☒ facsimile transmission ☐ hand delivery

of the documents/elements listed below:

- ☐ PCT request ( pages)
- ☐ description (excluding sequence listing part) ( pages)
- ☒ claims ( 7 pages)
- ☐ abstract ( pages)
- ☐ drawings ( pages)
- ☐ sequence listing part of description ( pages)
- ☐ fee calculation sheet
- ☐ separate authorization to charge deposit account
- ☐ cheque (indicate currency and amount)
- ☐ cash (in person only) (indicate amount)
- ☐ power of attorney (general power, copy of general power, separate power) (indicate kind and number)
- ☐ statement explaining lack of signature (if more than one, indicate number)
- ☐ priority document (if more than one, indicate number)
- ☐ separate indications concerning deposited microorganism or other biological material ( pages)
- ☐ nucleotide and/or amino acid sequence listing on diskette (if more than one diskette, indicate number)
- ☐ statement accompanying diskette containing sequence listing
- ☒ accompanying letter - 2 pages
- ☐ other (specify):

09/674399  
529 Rec'd PCT/PTC 31 OCT 2000

Agent's Reference No. P3958 127770

**TO THE INTERNATIONAL BUREAU OF WIPO**

APPLICANT: TOWNSEND ENGINEERING COMPANY, et al.  
INT'L APPLN NO: PCT/US00/02028  
INT'L FILING DATE: 26, January 2000  
TITLE: METHOD AND MEANS FOR FILLING NATURAL CASING SAUSAGES

**LETTER TRANSMITTING NEW SHEETS CONTAINING  
NEW CLAIM UNDER ARTICLE 19**

INTERNATIONAL BUREAU OF WIPO  
34, chemin des Colombettes  
1211 Geneva 20, SWITZERLAND

Dear Sir:

In response to the International Search Report and the prior art references disclosed therein dated June 6, 2000, enclosed are substitute pages 6, 6A, 7, 8, 9, 9A and 9B in the above international application. The following have been amended:

Claim 6, line 1, change "claim 1" to --claim 22--.

Claim 9, line 1, change "claim 7" to --claim 8--.

Claim 18, line 1, change "claim 6" to --claim 1--.

Claim 1 has been amended on page 6.

New claims 22-24 have been added as page 9A and 9B.

**REMARKS**

Independent method claim 1 has been amended to incorporate the limitations from claim 6 regarding the thrust collar, and the step of intermittently pushing the thrust collar against the casing without squeezing or compressing the casing, but to facilitate the forward movement of the casing on the stuffing tube. None of the cited references teach or suggest such a step of intermittently pushing the thrust collar on natural casing, as required by amended claim 1. Therefore, claim 1 and dependent claims 2-5 and 18 distinguish over the references so as to be in proper form for allowance.

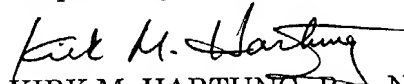
Independent machine claim 17 and independent machine claim 24 are similar to claim 1 in requiring a thrust collar slidably mounted on the stuffing tube for moving or pushing a natural casing on the stuffing tube. Since none of the references cited in the International Search Report disclose such a thrust collar, claim 10, and depending claims 11-16 and 19-21, as well as claim 17, distinguish over the references so as to be allowable.

Independent method claim 7 requires a step of "moving the casing hopper away from its position adjacent the case and filling station when natural casings are placed on a stuffing tube in the casing filling station." Similarly, independent machine claim 10 requires "means on the machine for moving the casing hopper away from its position adjacent the casing filling station when natural casings are placed on a stuffing tube in the casing filling station." None of the cited references show such a moveable casing hopper, such that claims 7 and 10 distinguish over the cited references so as to be allowable, along with claims 8 and 9 depending from claim 7 and claims 11-16 depending from claim 10.

New independent claim 22 incorporates the limitations from claims 1 and 3, and particularly requires a resilient brake element in the chuck to impede the longitudinal movement of the natural casing on the stuffing tube. Similarly, independent machine claim 23 requires the resilient brake element for impeding the movement of the natural casing on the stuffing tube. None of the references from the International Search Report teach or suggest such a resilient brake element. Accordingly, 22 and 23 distinguish over the references so as to be allowable.

In view of the foregoing, Applicant respectfully requests that a Notice of Allowance be issued.

Respectfully submitted,



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ZARLEY, McKEE, THOMTE, VOORHEES  
& SEASE  
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**AMENDED CLAIMS**

[received by the International Bureau on 25 July 2000 (25.07.00);  
original claims 1,6,9 and 18 amended ; new claims 22-24 added;  
remaining claims unchanged (7 pages)]

1. A method for filling a natural hollow elongated casing with a meat emulsion, comprising, placing a natural casing on an elongated meat emulsion stuffing tube having a meat emulsion discharge end, closing an extended end of the natural casing over the  
5 discharge end of the stuffing tube so that meat emulsion exiting the discharge end will push the natural casing longitudinally by pumping meat emulsion through the stuffing tube for expansive discharge into the natural casing at a sufficient volume and velocity to provide the primary energy within the natural casing to move the natural casing forwardly off of the discharge end of the stuffing tube, slidably mounting a thrust collar on the stuffing tube  
10 behind the natural casing, and intermittently pushing the thrust collar against the casing insufficiently to create squeezing or compression pressure thereon but to facilitate the normal forward movement of the casing on the stuffing tube beyond the normal movement of the casing caused by the energy of the emulsion entering the casing.
- 15 2. The method of claim 1 wherein water is applied to the natural casing before placing the casing on the stuffing tube to make the casing hydrated, soft, pliable and slippery to prevent adhesion of the casing to the stuffing tube.
- 20 3. The method of claim 1 wherein the forward end of the stuffing tube extends through a hollow chuck, placing a resilient brake element in the chuck around the stuffing tube to yieldingly engage the natural casing to impede the longitudinal movement of the natural casing on the stuffing tube.
- 25 4. The method of claim 1 wherein a rotatable linking assembly is located downstream of the discharge end of the stuffing tube to link the natural casing filled with the meat emulsion and to impede the longitudinal movement of natural casing from the stuffing tube.
- 30 5. The method of claim 1 wherein a meat pump is employed to pump meat emulsion through the stuffing tube, wherein the forward end of the stuffing tube extends through a hollow chuck, placing a resilient brake element in the chuck around the stuffing tube to

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yieldingly engage the natural casing to impede the longitudinal movement of the natural casing on the stuffing tube, wherein a rotatable linking assembly is located downstream of the discharge end of the stuffing tube to link the natural casing filled with the meat

emulsion and to impede the longitudinal movement of natural casing from the stuffing tube.

6. The method of claim 22 wherein a thrust collar is slidably mounted on the stuffing tube behind the natural casing, intermittently pushing the thrust collar against the casing insufficiently to create squeezing or compression pressure thereon but to facilitate the normal forward movement of the casing on the stuffing tube beyond the normal movement of the casing caused by the energy of the emulsion entering the casing.
7. A method for filling a natural hollow elongated casing with a meat emulsion, comprising, providing a casing filling station including a stuffing tube for supporting the casing to be filled with meat emulsion, providing a casing hopper adjacent the casing filling station to serve as a reservoir for a plurality of shirred artificial casings for delivery of shirred artificial casings for mounting on the stuffing tube, and moving the casing hopper away from its position adjacent the casing filling station when natural casings are placed on a stuffing tube in the casing filling station.
8. The method of claim 7 wherein a PLC is provided and senses when the casing hopper is in its position adjacent the casing filling station to thereupon control the longitudinal movement of the stuffing tube, to maintain the stuffing tube in a non-automatic extension mode, to hold a follower connected to the stuffing tube in a retracted position, and to maintain the casing hopper in its position adjacent the casing filling station.
9. The method of claim 8 wherein a natural casing is placed on the stuffing tube with the stuffing tube being in a partially retracted position to locate a discharge end of the stuffing tube upstream of the casing filling station; actuating the PLC to cause the stuffing tube to extend through a chuck, and to cause a meat pump to start pumping meat through the stuffing tube when the position of the stuffing tube through the chuck is sensed, and to start the rotation of the chuck and the stuffing tube, and to start the operation of linking chains and a conveyor located downstream from the casing filling station; manually



advancing the follower and sensing its arrival at a position adjacent a twister mechanism containing the chuck, and causing the PLC to stop the operation of the casing filling station.

5 10. A machine for filling meat emulsion into elongated natural or artificial casings, comprising, a casing filling station including a stuffing tube for supporting a casing to be filled with meat emulsion, a casing hopper to serve as a reservoir for a plurality of shirred artificial casings mounted on the machine adjacent the casing filling station for delivery of shirred artificial casings for mounting on the stuffing tube, and means on the machine for  
10 moving the casing hopper away from its position adjacent the casing filling station when natural casings are placed on a stuffing tube in the casing filling station.

11. The machine of claim 10 wherein the means for moving the casing hopper includes means for pivoting the casing hopper away from the casing filling station.

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12. The machine of claim 10 wherein the means for moving the casing hopper includes means for raising the casing hopper, pivoting the casing hopper, and thence lowering the casing hopper for moving the casing hopper away from the casing filling station.

20 13. The machine of claim 10 wherein the stuffing tube is longitudinally movably mounted on the machine, and means is associated with the stuffing tube to permit adjustment of its longitudinal movement.

14. The machine of claim 10 wherein the adjustment of the longitudinal movement of  
25 the stuffing tube is comprised of a removable hard stop, or a sensor actuated pneumatic control means.

15. The machine of claim 10 wherein at least one sensor is located in the machine to detect when the casing hopper is in its position adjacent the casing filling station; the  
30 sensor being operatively connected to a PLC to control longitudinal movement of the stuffing tube and to maintain the stuffing tube in a non-automatic extension mode, to hold

a follower connected to the stuffing tube in a retracted position, and to maintain the casing hopper in its position adjacent the casing filling station.

16. The machine of claim 15 wherein a natural casing is placed on the stuffing tube with the stuffing tube in a partially retracted position and with a discharge end being upstream of the casing filling station; the PLC upon being actuated is adapted to cause the stuffing tube to extend through a chuck, and to cause a meat pump to start pumping meat through the stuffing tube when the position of the stuffing tube through the chuck is sensed, and to start the rotation of the chuck and the stuffing tube, and to start the operation of linking chains and a conveyor located downstream from the casing filling station; a sensor on the machine adjacent a twister mechanism containing the chuck to detect the manual advancement of the follower in the proximity of the sensor to send a signal to the PLC to stop the operation of the casing filling station.

17. A sausage machine for filling natural casings which has a meat stuffing horn for receiving a hollow natural casing with a thrust collar slidably mounted on the stuffing tube for pushing a natural casing longitudinally on the stuffing tube.

18. The method of claim 1 wherein the thrust collar is intermittently manually pushed against the casing.

19. The machine of claim 10 wherein the means for moving the casing hopper includes means for horizontally pivoting the casing hopper away from the casing filling station.

20. The machine of claim 10 wherein the means for moving the casing hopper includes means for slidably moving the casing hopper away from the casing filling station.

21. The machine of claim 10 wherein the means for moving the casing hopper includes means for pivoting the casing hopper 180° away from the casing filling station.

22. A method for filling a natural hollow elongated casing with a meat emulsion, comprising, placing a natural casing on an elongated meat emulsion stuffing tube having a meat emulsion discharge end, closing an extended end of the natural casing over the discharge end of the stuffing tube so that meat emulsion exiting the discharge end will push  
5 the natural casing longitudinally by pumping meat emulsion through the stuffing tube for expansive discharge into the natural casing at a sufficient volume and velocity to provide the primary energy within the natural casing to move the natural casing forwardly off of the discharge end of the stuffing tube, wherein the forward end of the stuffing tube extends through a hollow chuck, and placing a resilient brake element in the chuck around the  
10 stuffing tube to yieldingly engage the natural casing to impede the longitudinal movement of the natural casing on the stuffing tube.

23. A machine for filling meat emulsion into elongated natural or artificial casings, comprising, a casing filling station including a stuffing tube for supporting a casing to be  
15 filled with meat emulsion, a casing hopper to serve as a reservoir for a plurality of shirred artificial casings mounted on the machine adjacent the casing filling station for delivery of shirred artificial casings for mounting on the stuffing tube, means on the machine for moving the casing hopper away from its position adjacent the casing filling station when natural casings are placed on a stuffing tube in the casing filling station, wherein the  
20 forward end of the stuffing tube extends through a hollow chuck, and a resilient brake element in the chuck around the stuffing tube to yieldingly engage the natural casing to impede the longitudinal movement of the natural casing on the stuffing tube.

24. A machine for filling meat emulsion into elongated natural or artificial casings, comprising, a casing filling station including a stuffing tube for supporting a casing to be  
25 filled with meat emulsion, a casing hopper to serve as a reservoir for a plurality of shirred artificial casings mounted on the machine adjacent the casing filling station for delivery of shirred artificial casings for mounting on the stuffing tube, means on the machine for moving the casing hopper away from its position adjacent the casing filling station when  
30 natural casings are placed on a stuffing tube in the casing filling station, and a thrust collar slidably mounted on the stuffing tube behind the natural casing for intermittent pushing against the casing insufficiently to create squeezing or compression pressure thereon but to

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facilitate the normal forward movement of the casing on the stuffing tube beyond the normal movement of the casing caused by the energy of the emulsion entering the casing.

TITLE: METHOD AND MEANS FOR FILLING NATURAL CASING SAUSAGES

BACKGROUND OF THE INVENTION

5           Sausages have been traditionally made by filling the natural intestines of sheep, for example, with the sausage meat product whereupon the filled natural casing was formed into links for cooking by the consumer. In more modern times, sausages are predominantly made by introducing a meat emulsion into an artificial casing which encased the sausage material through linking and preliminary cooking whereupon the casings are peeled from  
10 the sausage before being sold to the consumer. Machines for making sausages with artificial casings have a high volume capability (up to 30,000 sausages per hour). Efforts have been made to use these high speed machines with natural casings. However, because of the nature of the natural casings including their relatively shorter length and non-uniform diameter, modern sausage encasing machines have not achieved the volume and  
15 capacity with natural casings as they do with artificial casings.

It is therefore a principal object of this invention to provide a method and machine for filling natural casings which is economical, relatively fast, and easy to accomplish as compared to previous ways of filling natural casings.

A still further object of this invention is to provide a method and a machine for  
20 filling natural casings wherein the meat pressure expands the natural casing and pushes the casing forward as the meat emulsion discharges from a conventional hollow stuffing horn.

A further object of this invention is to provide a machine and method for filling a natural casing wherein the filled casing passes through a hollow chuck with a resilient brake therein which impedes the movement of the casing from the stuffer tube and wherein  
25 the resilient brake creates a balance between the meat pushing forward on the casing and the brake holding back on the casing, all to create the desired fill or plumpness of the resulting sausage.

A still further object of this invention is to provide a flexible or resilient brake in a hollow chuck through which the filled casing moves in a rotatable twisting head which not  
30 only produces a longitudinal drag on the casing to resist forward motion thereof, but also

provides a radial rotating course which helps to rotate the casing and thereupon facilitate twisting thereof as the filled sausage casing moves through the linking chains.

A still further object of this invention is to provide a follower or thrust collar on the stuffing tube upstream of the natural casing which is manually and intermittently pushed  
5 against the back side of the natural casing which provides a light force to prevent the natural casing from sticking to the tube but does not serve to move the natural casing from the tube, for this is accomplished by the momentum of the meat emulsion filling the casing. This force is insufficient to cause squeezing pressure between the follower and the twisting head.

10 A still further object of this invention is to provide a method and machine which will permit easy conversion of the machine from the natural casing operation to the artificial casing operation.

A still further object of the invention is to provide a casing clamp and casing  
15 hopper on a sausage making machine which can be moved away from the casing filling station at times to accommodate the natural casing mode for the machine.

A still further object of the invention is to provide a method and apparatus for filling a natural casing which has the ability to change the stuffing tube from a full stroke as with artificial casings to a partial stroke for use with natural casings.

A still further object of the invention is to provide a method and machine for filling  
20 natural casings which has a thrust collar that can be manually controlled by the operator, or an automatic follower which will duplicate the manual operation by providing a series of intermittent push and release actions to move the unshirred casing forward.

A still further object of the invention is to provide a method and machine to fill  
25 natural casings wherein water is present at various stages of the operation to keep the natural casing from becoming dehydrated and to maintain its very soft, pliable and slippery character.

A still further object of the invention is to provide a method and machine for filling natural casings which utilizes a cooling turban as a part of the rotating twister.

These and other objects will be apparent to those skilled in the art.

## SUMMARY OF THE INVENTION

A method of filling a natural hollow elongated casing with meat emulsion involves placing a natural casing on an elongated meat emulsion stuffing tube having a meat emulsion discharge end, closing an extended end of the natural casing over the discharge end of the stuffing tube so that meat emulsion exiting the discharge end will push the natural casing longitudinally by pumping meat emulsion through the stuffing tube for expansive discharge into the natural casing at a sufficient volume and velocity to provide the primary energy within the natural casing to move the natural casing forwardly off of the discharge end of the stuffing tube. The casing is extended through a hollow chuck. A resilient brake element in the chuck is extended around the casing to impede its longitudinal movement. A thrust collar is slidably mounted on the stuffing tube and is intermittently manually pushed against the casing to limit the length thereof but is insufficient to create compression pressure thereon.

An apparatus for filling meat emulsion into an elongated natural or artificial casing has (a) a casing filling station including a stuffing tube for supporting a casing to be filled with meat emulsion, (b) a casing hopper to serve as a reservoir for a plurality of shirred artificial casings mounted on the machine adjacent the casing filling station for delivery of shirred artificial casings for mounting on the stuffing tube, and (c) means on the machine for moving the casing hopper away from its position adjacent the casing filling station when natural casings are placed on a stuffing tube in the casing filling station.

## BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a prior art sausage encasing machine which shows the general relationship of the major components of the sausage making machine of this invention;

Fig. 2 is an enlarged scale perspective view of the prior art machine of Fig. 1 taken on line 2-2 of Fig. 1;

Figs. 2A and 2B show the casing hopper of Fig. 2 in forward and rearward positions, respectively;

Fig. 3 is an enlarged scale perspective view of the machine of Fig. 2 using conventional shirred casings;

Figs. 3A and 3B are enlarged scale perspective views of the conventional components of a sausage encasing machine after the natural casing is placed on the stuffing horn;

Fig. 4 is an enlarged scale sectional view of the chuck; and

Fig. 5 is a view similar to Fig. 5 during the casing filling process.

#### DESCRIPTION OF THE PREFERRED EMBODIMENT

A sausage encasing machine 10 (Fig. 1) has a frame 12, and a conventional meat emulsion pump 14 connected to a source of meat emulsion. A stuffing horn 16 is slidably and operably connected to the pump 14 and is longitudinally moveable by air piston 17 contained in housing 18 (Fig. 1). A follower rod 20 is also slidably mounted on the pump 14 parallel to horn 16 and has an actuator 22 on one end slidably mounted on horn 16. Follower rod 20 is powered by air piston 24 located in housing 18. An elongated shirred sausage casing 26 is convention-ally mounted on horn 16. The forward end of horn 16 conventionally terminates at casing filling station 27 (Fig. 3) adjacent twister housing 28 which has a hollow rotatable chuck 29 which receives a meat filled casing 26 and rotates it before the meat filled casing moves into conventional linker 30. (Fig. 4, 5). The chains 31 of linker 30 are rotated by a motor 34 through suitable shafts, gears or belts. The conventional chuck 120 (Figs. 4, 5) in housing 28 is rotated by a motor (not shown) through suitable shafts and gears. Linker 30 is positioned within housing 36 (Fig. 1). The foregoing components are all conventional and are well known in the art, (see U.S. Patent No. 3,115,668) and are controlled by computer control 38 (Fig. 1).

The completed strand of sausages 40 exits the machine 10 through horn 42 and the strand is deposited on the chain of hooks of conventional conveyor 44 (Fig. 1).

A casing hopper 46 has tapered sidewalls 48 and a sloping bottom 50 (Fig. 2) which cause shirred casings 26 therein to migrate downwardly towards a bottom opening 52. Hopper 46 is pivoted at 54 (Fig. 2) to any convenient side supports 56. It is also mounted on plate 58 which is pivotally mounted on plate 60 on a vertical axis of pin 61 to be rotated from the forward aperture position of Fig. 2A for filling shirred casings to an inoperative rearward position of Fig. 2B when not in use. A removable lock pin 62 extends between plates 58 and 60 to selectively lock hopper 46 in a forward or rearward position. A PLC 66



is mounted on machine 10 to program and coordinate the components of the machine. The PLC will control the pump 14, the rotation and longitudinal movement of horn 16, the position of hopper 46, and the operation of chuck 120, linker 30 and conveyor 44. A sensor or stop 67 (Figs. 3-5) adjacent the twister 28 will cause the functions at the filling station 27 to cease when the casing 220 is filled.

A rotatable chuck 100 (Figs. 5 and 6) has a cylindrical body portion 120 with a longitudinal center bore 140. A resilient brake element 160 is deposited within the center portion of bore 140. The brake 160 has a center bore 180 through which the stuffing horn 16 extends with a natural casing 220 thereon. The brake 160 provides a longitudinal drag on the natural casing as described heretofore. The location of the brake 160 in the chuck 100 can vary from one end to the other. It can be integral with the cylindrical housing 120, or can be of a separate material that is affixed in any convenient manner to the interior center bore of the chuck. The friction applied to the natural casing by the brake 160 merely impedes the free flow of the natural casing from the surface of the stuffing tube, but is insufficient to prevent the movement of the natural casing from the stuffing tube provided by the energy of the meat emulsion discharged from the stuffing tube into the interior of the natural casing.

When it is desired to change the machine 10 from filling conventional shirred casings to the filling of natural casings, the lock pin 62 is released and the hopper 46 is rotated about pin 61 from the forward position of Fig. 2B to the inoperative position of Fig. 2A so that it is out of the way for the process of filling natural casings. The thrust collar 200 is slidably mounted on the stuffing tube 16 (Figs. 3 and 4) behind the natural casing 220. The collar 200 is intermittently manually or automatically pushed against the casing insufficiently to create squeezing or compression pressure thereon but to facilitate the normal forward movement of the casing on the stuffing tube beyond the normal movement of the casing caused by the energy of the emulsion entering the casing. The longitudinal displacement of tube 16 is typically shortened by the PLC 66 when natural casings are being filled. The hopper 46 can be mechanically lifted, hinged, or moved by sliding to move out of the way to facilitate the process for filling the natural casings.

It is therefore seen that this machine will achieve at least all of its stated objectives.

What is claimed:

1. A method for filling a natural hollow elongated casing with a meat emulsion, comprising, placing a natural casing on an elongated meat emulsion stuffing tube having a meat emulsion discharge end, closing an extended end of the natural casing over the  
5 discharge end of the stuffing tube so that meat emulsion exiting the discharge end will push the natural casing longitudinally by pumping meat emulsion through the stuffing tube for expansive discharge into the natural casing at a sufficient volume and velocity to provide the primary energy within the natural casing to move the natural casing forwardly off of the discharge end of the stuffing tube, slidably mounting a thrust collar on the stuffing tube  
10 behind the natural casing, and intermittently pushing the thrust collar against the casing insufficiently to create squeezing or compression pressure thereon but to facilitate the normal forward movement of the casing on the stuffing tube beyond the normal movement of the casing caused by the energy of the emulsion entering the casing.

15 2. The method of claim 1 wherein water is applied to the natural casing before placing the casing on the stuffing tube to make the casing hydrated, soft, pliable and slippery to prevent adhesion of the casing to the stuffing tube.

20 3. The method of claim 1 wherein the forward end of the stuffing tube extends through a hollow chuck, placing a resilient brake element in the chuck around the stuffing tube to yieldingly engage the natural casing to impede the longitudinal movement of the natural casing on the stuffing tube.

25 4. The method of claim 1 wherein a rotatable linking assembly is located downstream of the discharge end of the stuffing tube to link the natural casing filled with the meat emulsion and to impede the longitudinal movement of natural casing from the stuffing tube.

30 5. The method of claim 1 wherein a meat pump is employed to pump meat emulsion through the stuffing tube, wherein the forward end of the stuffing tube extends through a hollow chuck, placing a resilient brake element in the chuck around the stuffing tube to

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yieldingly engage the natural casing to impede the longitudinal movement of the natural casing on the stuffing tube, wherein a rotatable linking assembly is located downstream of the discharge end of the stuffing tube to link the natural casing filled with the meat

emulsion and to impede the longitudinal movement of natural casing from the stuffing tube.

6. The method of claim 22 wherein a thrust collar is slidably mounted on the stuffing tube behind the natural casing, intermittently pushing the thrust collar against the casing insufficiently to create squeezing or compression pressure thereon but to facilitate the normal forward movement of the casing on the stuffing tube beyond the normal movement of the casing caused by the energy of the emulsion entering the casing.

7. A method for filling a natural hollow elongated casing with a meat emulsion, comprising, providing a casing filling station including a stuffing tube for supporting the casing to be filled with meat emulsion, providing a casing hopper adjacent the casing filling station to serve as a reservoir for a plurality of shirred artificial casings for delivery of shirred artificial casings for mounting on the stuffing tube, and moving the casing hopper away from its position adjacent the casing filling station when natural casings are placed on a stuffing tube in the casing filling station.

8. The method of claim 7 wherein a PLC is provided and senses when the casing hopper is in its position adjacent the casing filling station to thereupon control the longitudinal movement of the stuffing tube, to maintain the stuffing tube in a non-automatic extension mode, to hold a follower connected to the stuffing tube in a retracted position, and to maintain the casing hopper in its position adjacent the casing filling station.

9. The method of claim 8 wherein a natural casing is placed on the stuffing tube with the stuffing tube being in a partially retracted position to locate a discharge end of the stuffing tube upstream of the casing filling station; actuating the PLC to cause the stuffing tube to extend through a chuck, and to cause a meat pump to start pumping meat through the stuffing tube when the position of the stuffing tube through the chuck is sensed, and to start the rotation of the chuck and the stuffing tube, and to start the operation of linking chains and a conveyor located downstream from the casing filling station; manually

advancing the follower and sensing its arrival at a position adjacent a twister mechanism containing the chuck, and causing the PLC to stop the operation of the casing filling station.

5 10. A machine for filling meat emulsion into elongated natural or artificial casings, comprising, a casing filling station including a stuffing tube for supporting a casing to be filled with meat emulsion, a casing hopper to serve as a reservoir for a plurality of shirred artificial casings mounted on the machine adjacent the casing filling station for delivery of shirred artificial casings for mounting on the stuffing tube, and means on the machine for  
10 moving the casing hopper away from its position adjacent the casing filling station when natural casings are placed on a stuffing tube in the casing filling station.

11. The machine of claim 10 wherein the means for moving the casing hopper includes means for pivoting the casing hopper away from the casing filling station.

15

12. The machine of claim 10 wherein the means for moving the casing hopper includes means for raising the casing hopper, pivoting the casing hopper, and thence lowering the casing hopper for moving the casing hopper away from the casing filling station.

20 13. The machine of claim 10 wherein the stuffing tube is longitudinally movably mounted on the machine, and means is associated with the stuffing tube to permit adjustment of its longitudinal movement.

14. The machine of claim 10 wherein the adjustment of the longitudinal movement of  
25 the stuffing tube is comprised of a removable hard stop, or a sensor actuated pneumatic control means.

15. The machine of claim 10 wherein at least one sensor is located in the machine to detect when the casing hopper is in its position adjacent the casing filling station; the  
30 sensor being operatively connected to a PLC to control longitudinal movement of the stuffing tube and to maintain the stuffing tube in a non-automatic extension mode, to hold

a follower connected to the stuffing tube in a retracted position, and to maintain the casing hopper in its position adjacent the casing filling station.

16. The machine of claim 15 wherein a natural casing is placed on the stuffing tube with the stuffing tube in a partially retracted position and with a discharge end being upstream of the casing filling station; the PLC upon being actuated is adapted to cause the stuffing tube to extend through a chuck, and to cause a meat pump to start pumping meat through the stuffing tube when the position of the stuffing tube through the chuck is sensed, and to start the rotation of the chuck and the stuffing tube, and to start the operation of linking chains and a conveyor located downstream from the casing filling station; a sensor on the machine adjacent a twister mechanism containing the chuck to detect the manual advancement of the follower in the proximity of the sensor to send a signal to the PLC to stop the operation of the casing filling station.

17. A sausage machine for filling natural casings which has a meat stuffing horn for receiving a hollow natural casing with a thrust collar slidably mounted on the stuffing tube for pushing a natural casing longitudinally on the stuffing tube.

18. The method of claim 1 wherein the thrust collar is intermittently manually pushed against the casing.

19. The machine of claim 10 wherein the means for moving the casing hopper includes means for horizontally pivoting the casing hopper away from the casing filling station.

20. The machine of claim 10 wherein the means for moving the casing hopper includes means for slidably moving the casing hopper away from the casing filling station.

21. The machine of claim 10 wherein the means for moving the casing hopper includes means for pivoting the casing hopper 180° away from the casing filling station.

22. A method for filling a natural hollow elongated casing with a meat emulsion, comprising, placing a natural casing on an elongated meat emulsion stuffing tube having a meat emulsion discharge end, closing an extended end of the natural casing over the discharge end of the stuffing tube so that meat emulsion exiting the discharge end will push the natural casing longitudinally by pumping meat emulsion through the stuffing tube for expansive discharge into the natural casing at a sufficient volume and velocity to provide the primary energy within the natural casing to move the natural casing forwardly off of the discharge end of the stuffing tube, wherein the forward end of the stuffing tube extends through a hollow chuck, and placing a resilient brake element in the chuck around the stuffing tube to yieldingly engage the natural casing to impede the longitudinal movement of the natural casing on the stuffing tube.

23. A machine for filling meat emulsion into elongated natural or artificial casings, comprising, a casing filling station including a stuffing tube for supporting a casing to be filled with meat emulsion, a casing hopper to serve as a reservoir for a plurality of shirred artificial casings mounted on the machine adjacent the casing filling station for delivery of shirred artificial casings for mounting on the stuffing tube, means on the machine for moving the casing hopper away from its position adjacent the casing filling station when natural casings are placed on a stuffing tube in the casing filling station, wherein the forward end of the stuffing tube extends through a hollow chuck, and a resilient brake element in the chuck around the stuffing tube to yieldingly engage the natural casing to impede the longitudinal movement of the natural casing on the stuffing tube.

24. A machine for filling meat emulsion into elongated natural or artificial casings, comprising, a casing filling station including a stuffing tube for supporting a casing to be filled with meat emulsion, a casing hopper to serve as a reservoir for a plurality of shirred artificial casings mounted on the machine adjacent the casing filling station for delivery of shirred artificial casings for mounting on the stuffing tube, means on the machine for moving the casing hopper away from its position adjacent the casing filling station when natural casings are placed on a stuffing tube in the casing filling station, and a thrust collar slidably mounted on the stuffing tube behind the natural casing for intermittent pushing against the casing insufficiently to create squeezing or compression pressure thereon but to

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facilitate the normal forward movement of the casing on the stuffing tube beyond the normal movement of the casing caused by the energy of the emulsion entering the casing.



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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/US00/02028		Jay, D. [US/US]; 2425 Hubbell Avenue, Des Moines, IA 50317 (US).	
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(30) Priority Data: 60/127,770 5 April 1999 (05.04.99) US		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).	
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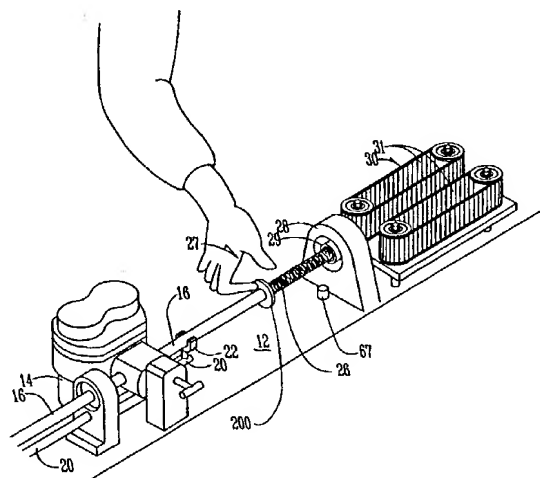
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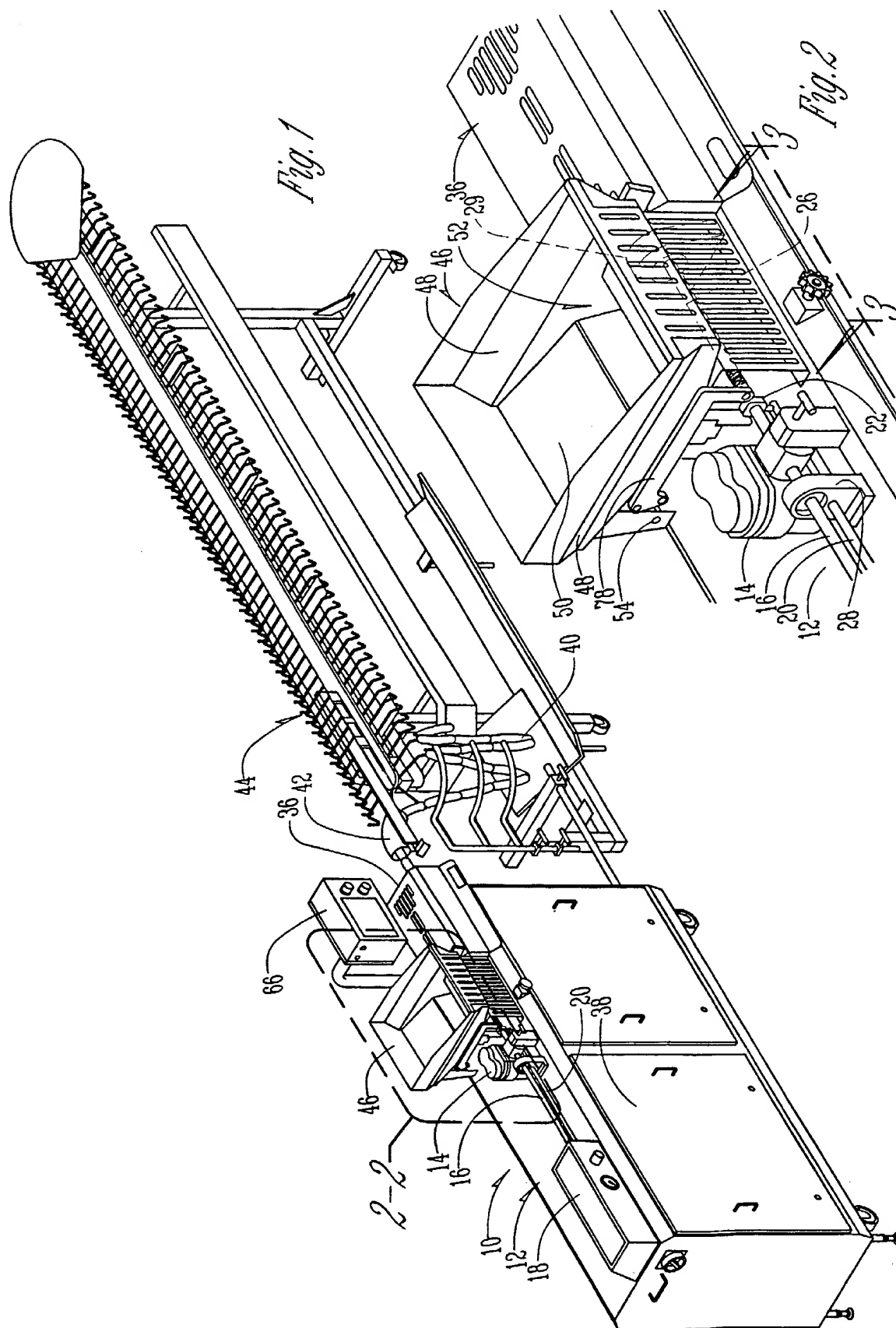
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With amended claims.

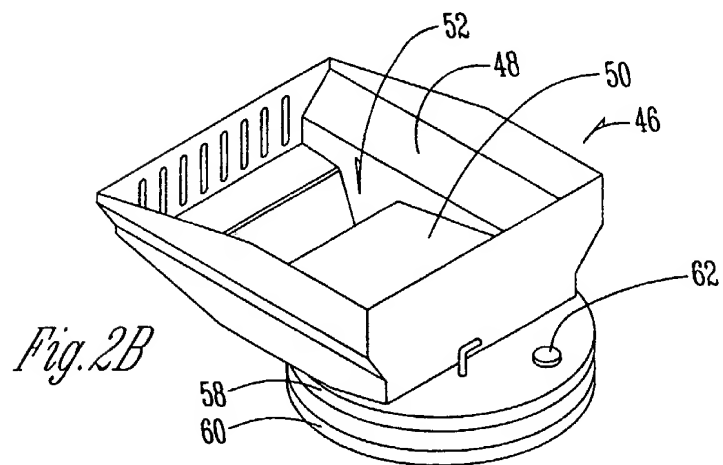
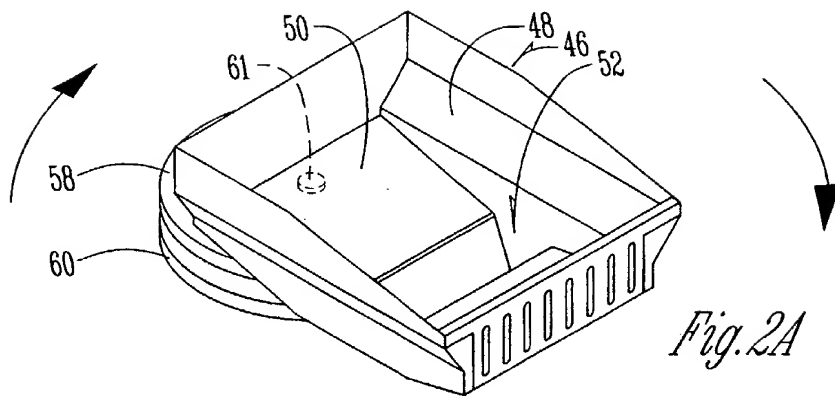
(54) Title: METHOD AND MEANS FOR FILLING NATURAL CASING SAUSAGES

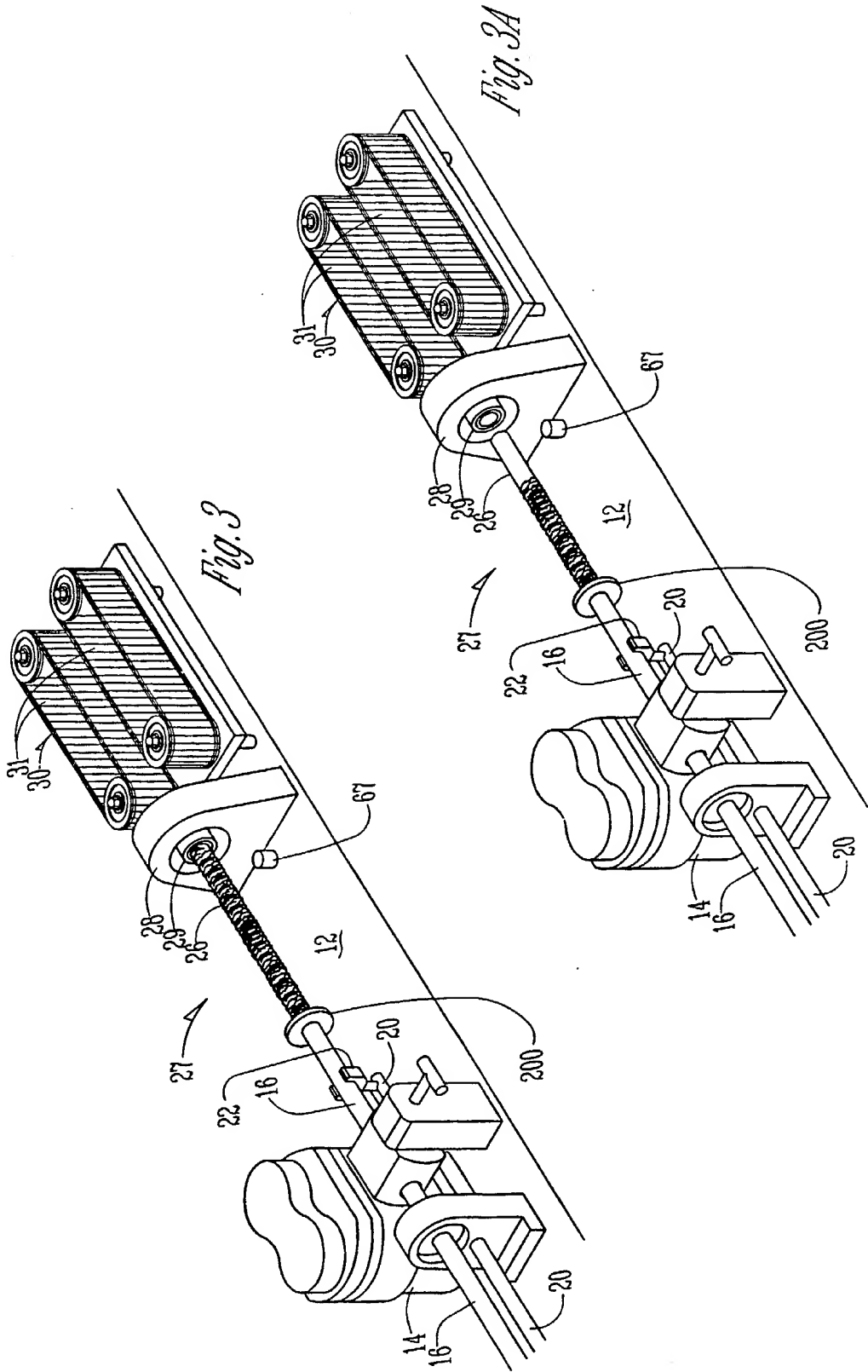
(57) Abstract

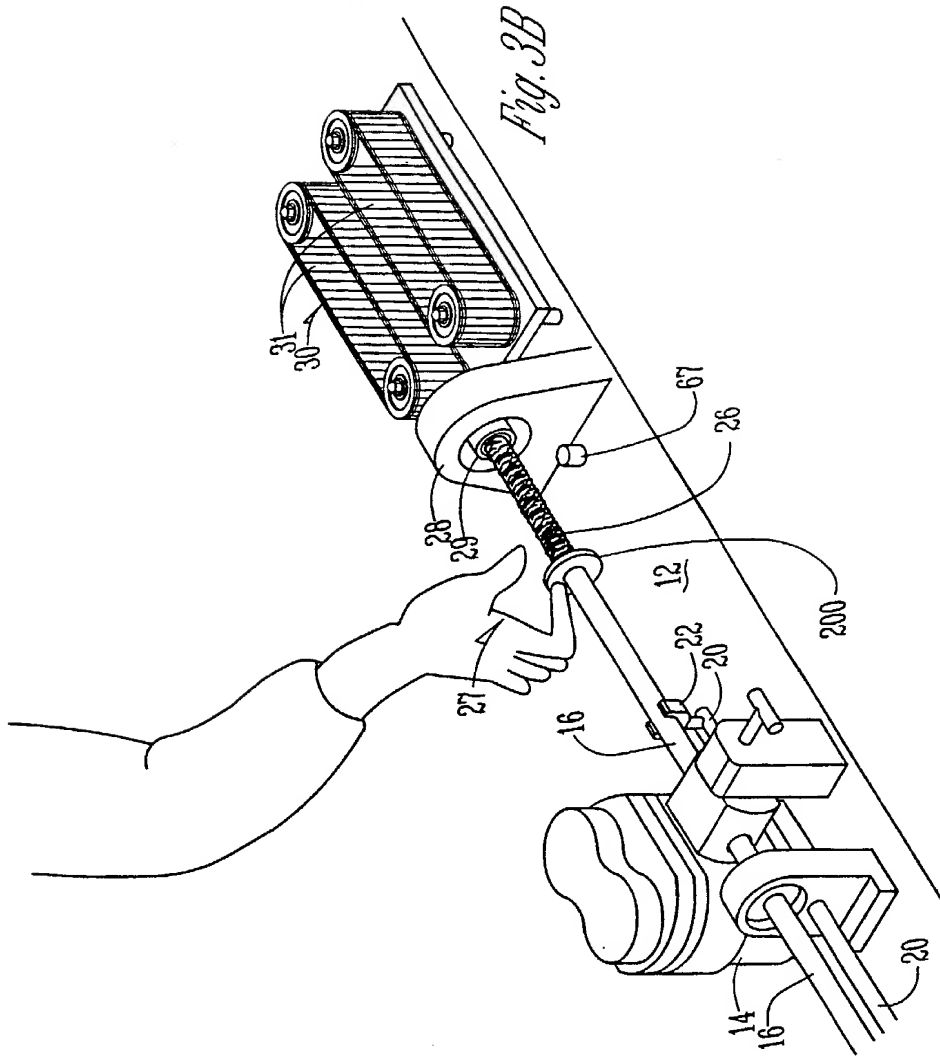
A method of filling a natural hollow elongated casing with meat emulsion involves placing a natural casing on an elongated meat emulsion stuffing tube having a meat emulsion discharge end, closing an extended end of the natural casing over the discharge end of the stuffing tube so that meat emulsion exiting the discharge end will push the natural casing longitudinally by pumping meat emulsion through the stuffing tube for expansive discharge into the natural casing at a sufficient volume and velocity to provide the primary energy within the natural casing to move the natural casing forwardly off of the discharge end of the stuffing tube. The casing is extended through a hollow chuck (100). A resilient brake element (160) in the chuck is extended around the casing to impede its longitudinal movement. A thrust collar (200) is slidably mounted on the stuffing tube and is intermittently manually pushed against the casing to limit the length thereof but is insufficient to create compression pressure thereon. An apparatus for filling a natural casing has a thrust collar on the stuffing horn (16) for pushing the natural casing longitudinally, and a casing hopper (46) that can be pivoted from a forward operating position to a rearward inoperative position.











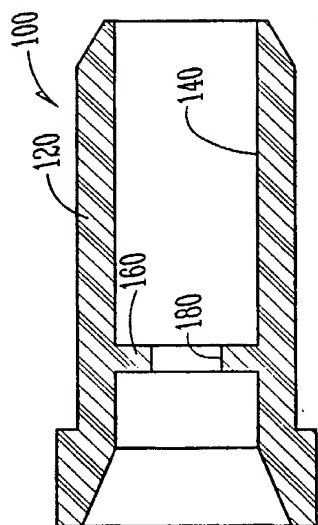


Fig. 4

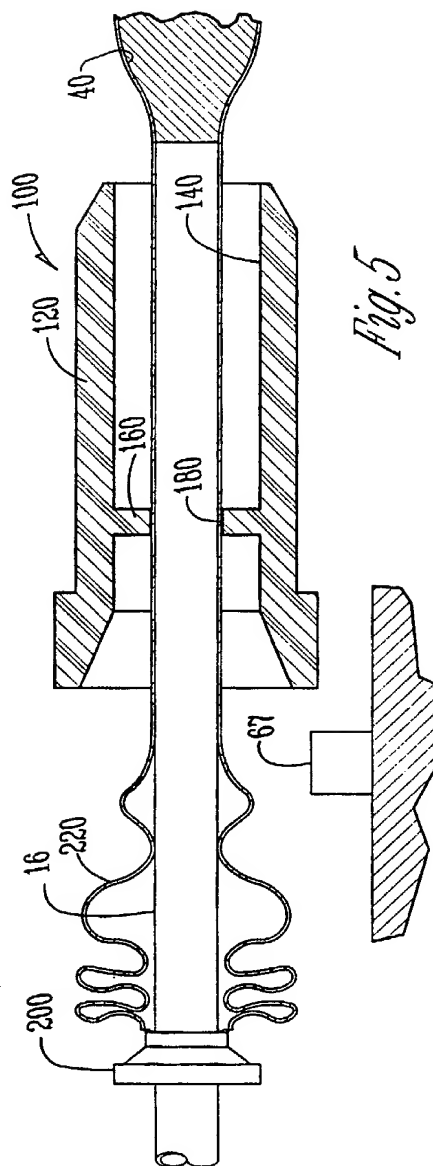


Fig. 5

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<b>DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION</b> <b>(37 CFR 1.63)</b>  <input type="checkbox"/> Declaration Submitted with Initial Filing <b>OR</b> <input type="checkbox"/> Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)	<b>Attorney Docket Number</b>	P03958US1
	<b>First Named Inventor</b>	Stephen Cate et al.
	<b>COMPLETE IF KNOWN</b>	
	<b>Application Number</b>	09/674,399
	<b>Filing Date</b>	10/31/2000
	<b>Art Unit</b>	
	<b>Examiner Name</b>	Daniel Stemmer

As the below named inventor, I hereby declare that:

My residence, mailing address, and citizenship are as stated below next to my name.

I believe I am the original and first inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**METHOD AND MEANS FOR FILLING NATURAL CASING SAUSAGES**

(Title of the Invention)

the specification of which

☐ is attached hereto

OR

☒ was filed on (MM/DD/YYYY)

10/31/2000

as United States Application Number or PCT International

Application Number **PCT/US00/02028** and was amended on (MM/DD/YYYY) **01/26/2000** (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
				YES	NO
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto:

[Page 1 of 2]

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## DECLARATION — Utility or Design Patent Application

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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☒ Additional inventors are being named on the 3 supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto.



**ADDITIONAL INVENTOR(S)**  
Supplemental Sheet  
Page 1 of 3

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PTO/SB/02A (10-00)

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<b>DECLARATION</b>	<b>ADDITIONAL INVENTOR(S)</b> <b>Supplemental Sheet</b> Page <u>2</u> of <u>3</u>
--------------------	---

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City <u>Woerden</u>	State <u>Netherlands</u>	ZIP <u></u>	Country <u>The Netherlands</u>

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# DECLARATION

ADDITIONAL INVENTOR(S)  
Supplemental Sheet  
Page 3 of 3

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Name of Additional Joint Inventor, if any:

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Residence: City

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Name of Additional Joint Inventor, if any:

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Applicant or Patentee: Stephen H. Cate, Marcellinus Franciscus Ottow, Steven P. Hergott, Vincent L. Basile, II, Michael S. Simpson, David S. Hamblin, Ken L. Lebsack, Rudolph P. Enklaar, Jay D. Thomas

Serial No. or Patent No: \_\_\_\_\_

Filed or Issued: \_\_\_\_\_

For: METHOD AND MEANS FOR FILLING NATURAL CASING SAUSAGES

**VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY  
STATUS (37 CFR 1.9(d) AND 1.27(c)) - SMALL BUSINESS CONCERN**

I hereby declare that I am

☐ the owner of the small business concern identified below:

☒ an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN Townsend Engineering Company

ADDRESS OF CONCERN 2425 Hubbell Avenue, Des Moines, Iowa 50317

I hereby declare that the above-identified small business concern qualifies as a small business concern as defined in 18 CFR 121.3-18, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention, entitled METHOD AND MEANS FOR FILLING NATURAL CASING SAUSAGES by inventor(s) Stephen H. Cate, Marcellinus Franciscus Ottow, Steven P. Hergott, Vincent L. Basile, II, Michael S. Simpson, David S. Hamblin, Ken L. Lebsack, Rudolph P. Enklaar, Jay D. Thomas, described in

☒ the specification filed herewith.

☐ application Serial No. \_\_\_\_\_, filed \_\_\_\_\_

☐ Patent No. \_\_\_\_\_, issued \_\_\_\_\_

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights in the invention is listed below\* and no rights to the invention are held by any person, other than the inventor, who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person made the invention, or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

*\*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27).*

FULL NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

☐ INDIVIDUAL

☐ SMALL BUSINESS CONCERN

☐ NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of payment, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

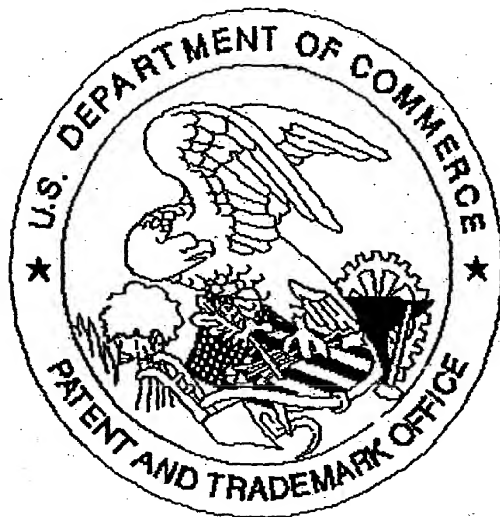
NAME AND TITLE OF PERSON SIGNING Al D. Larson, Vice President - Treasurer

ADDRESS OF PERSON SIGNING 2425 Hubbell Avenue, Des Moines, Iowa 50317

SIGNATURE \_\_\_\_\_

DATE \_\_\_\_\_

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